

REMARKS

Claims 1-7, 9-15 and 17-18 are all the claims in the invention. Claims 1-7, 9-15 and 17-19 stand rejected on prior art grounds. Claim 19 is canceled herein without prejudice or disclaimer. Applicants respectfully traverse the prior art rejections based on the following discussion.

I. The Prior Art Rejections

Claims 1-7, 9-15 and 17-19 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Honma, et al. (U.S. Patent No. 6,596,086), hereinafter referred to as "Honma", in view of Hoshina, et al. (U.S. Patent No. 5,785,764), hereinafter referred to as "Hoshina". Claims 1-7, 9-15 and 17-19 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Zhao, et al. (U.S. Patent No. 5,968,379), hereinafter referred to as "Zhao", in view of Hoshina. Applicants respectfully traverse these rejections based on the following discussion.

A. The Rejection Based on Honma in View of Hoshina

Regarding independent claims 1, 7, and 15, and related dependent claims 2-6, 9-14 and 17-19, first, the references, separately, or in combination, fail to disclose, teach or suggest a reason or motivation for being combined.

Second, even assuming that the references would have been legally combinable, Honma does not teach or suggest the features of independent claim 1, and similarly independent claims 7 and 15, including the projections have a beveled edge, such that an acute angle greater than 80 degrees occurs between the lower surface and the beveled edge. (See Page 7, Paragraph [0020]).

Indeed, the Examiner admits that Honma "do[es] not disclose [a] plurality of beveled edge projections extending radially inward from the inner edge," and thus, Honma is deficient in not disclosing the above feature of Applicants' claimed invention. (See Office Action, Page 2, Section 4).

Hoshina is also deficient.

In contrast, Figures 1A, 1B, 2 and 5A of Hoshina merely disclose a susceptor 1 for a gas phase growth apparatus to which a round depressed pocket 2 with a bottom a side wall is formed for the placing of a semiconductor wafer 3 where a protuberance 6 is provided on the circumference of the pocket at and near the position where the semiconductor wafer touches the side wall 4 of the pocket 2 and a back side of the wafer touches the bottom 5 of the pocket 2 so that an angle θ_1 is formed between a side 6a of the protuberance facing the bottom 5 of the pocket 2 and the bottom 5 of the pocket is set to be an acute angle." Contrary to the assertion in the Office Action, the acute angle is in a "range of 40-80 degrees, preferably in a range of 60-75 degrees," and is not greater than 80 degrees between a lower surface and a beveled edge as claimed by Applicant. (See Hoshina at Abstract; Column 3, lines 10-43; Column 5, lines 1-13; Column 7, lines 5-15; and Figures 1A, 1B, 2 and 5A).

To reiterate, page 2 of the Office Action states that "Hoshina et al disclose a susceptor with a pocket to hold a substrate, [and a] plurality of C shaped projections (Fig 5A-17) extending radially inward[s] at an acute angle of 80 degrees (complementary 10 degrees) with respect to [the] bottom of [the] pocket." Applicants completely agree with this fact. However, this is not what the Applicants' claimed language is directed to. Clearly, the Applicants' claimed language is contrary to this. Again, independent claim 1 states, in part, "...wherein said projections have a beveled edge, such that an acute angle greater than 80 degrees occurs between said lower surface

and said beveled edge....” Independent claims 7 and 15 state, in part, “...wherein an acute angle greater than 80 degrees occurs between said lower surface and said beveled edge.” Clearly, there appears to be a misunderstanding of basic mathematical principles. Applicants contend that a “range of 40-80 degrees” provided in Hoshina does not overlap the claimed “greater than 80 degrees.” Basic mathematical rules provide that the phrase “greater than” means non inclusive of the lower numerical range. In the Applicants’ case, “greater than” means greater (but not equal) to 80 degrees. In Hoshina, the “range of 40-80 degrees” means at most 80 degrees for the upper bound of the range. Apparently, the position taken in the Office Action, for which the rejection is being based upon, is contrary to the Applicants’ interpretation of basic mathematical concepts. Therefore, Applicants strongly contend that Hoshina cannot and does not teach the claimed invention even if combined with Honma.

Page 4 of the Office Action states that, “[S]ince Hoshina discloses [an] angle of 80 degrees, it is in [the] overlapping range with the claim of 80-85 degrees.” First, none the Applicants’ claims recite a range of 80-85 degrees. Second, for the reasons stated above, the Applicant’s claims are directed at a range of greater than 80 degrees (independent claims 1, 7, and 15) and not greater than 85 degrees (dependent claims 5, 13, and 17). Thus, the claimed invention is not in the overlapping range cited in Hoshina.

In other words, Hoshina teaches away from Applicants’ claimed invention. As indicated, if the “angle θ_1 is larger than 80 degrees, then, when forming a thick thin film, the amount of the source material gas which flows around to the contact area between the wafer 3 and the side wall 4 of the pocket 2 and its vicinity increases and cross bridges grow due to the deposition of silicon, resulting in adhesion which causes cracks or breakage when taking out the wafer 3 from the pocket 2 after the gas phase growth.”

Accordingly, Hoshina's invention cannot operate effectively when the angle θ_1 is larger than 80 degrees and improve film uniformity without errors contrary to this, Applicants' invention is indeed workable without errors when the angle is greater than 80 degrees. Therefore, Applicants' invention is not obvious, and one of ordinary skill in the art would not attempt to increase the angle θ_1 to be larger than 80 degrees as suggested in the Office Action because Hoshina, as indicated above, suggests his invention would be unworkable if an angle of greater than 80 degrees was used. Thus Hoshina does not teach or suggest including the projections have a beveled edge, such that an acute angle greater than 80 degrees occurs between the lower surface and the beveled edge. (See Column 5, lines 20-32).

Applicants teach an apparatus for holding a substrate including projections having a beveled edge of a projection 115 where an acute angle 201 greater than 80 degrees occurs between the lower surface of an opening and the beveled edge. Since angle 200 combined with the complimentary acute angle 201 form a 90 degree angle and, as indicated, "angle 200 is generally between 5 and 10 degrees," then angle 201 includes an acute angle less than 90 degrees, "e.g., 80-85 degrees." As a result, the acute angle 201 is greater than 80 degrees between the lower surface and the beveled edge.

As previously discussed, the criticality of the acute angle 201 being greater than 80 degrees is that the beveled side of wall of the projection reduces the contact area between the projection 115 and the substrate 102, thereby reducing the possibility that the substrate 120 will stick within the pocket of the apparatus 100." Accordingly, "the invention is improving film uniformity of the semiconductor wafer undergoing processing while providing small points of contact with the wafer, and thus improving the angle of the contacts to prevent errors. (See Page 4-Page 5, Paragraph [0011]; and Page 7, Paragraph [0020]).

Please note, as previously indicated, the angle configuration (greater than 80 degrees) is quite critical to the claimed invention, and is not merely a design choice. The claimed invention provides an apparatus/susceptor which is utilized in wafer processing, and in particular in heavy volume wafer processing. As such, manufacturing speed and efficiency are central to use of the claimed invention in heavy volume wafer processing. Thus, the lifting pin provided by the claimed invention aids in speeding the wafer processing as opposed to manual lifting or lifting by an unattached and/or incongruous mechanism. However, the device in Hoshina does not provide lifting pins, and as such is suggestive of not being incorporated in heavy wafer processing.

In non-heavy volume wafer processing, such as, Hoshina, the susceptor may be positioned sufficiently level, such that it does not move (i.e., through vibrations, etc.). However, in most conventional heavy volume wafer processing susceptors, due to the speed at which these devices operate, vibrational forces tend to shift the susceptor causing it to become non-leveled, which may cause the wafer to slide slightly on one side of the susceptor, which then causes the wafer to be in contact with two beveled retainers. In this case, the angle of the retainers is extremely critical. If the angle is less than 80 degrees, as demonstrated during the loading/unloading tests (when the wafer being lifted from the pocket), scratches result on the edge of the wafer due to excessive contact/friction between wafer and retainers. This creates foreign material generation and can result in wafer failure (i.e., wafer breakage). The Office Action, on page 4, states that "[t]here is no mention of the amount of scratches when the angle is exactly 80 degrees." However, it is irrelevant what the results are at exactly 80 degrees because the claimed language is not directed to exactly 80 degrees, but rather greater than 80 degrees. Therefore, the retainer angle is very critical and must be greater than 80 degrees for the device to

function properly. In fact, experimental testing performed on the apparatus/susceptor provided by the claimed invention illustrated that all wafer transfers (loading/unloading testing) were friction free (i.e., no scratches or breakage) at angles greater than 80 degrees.

Furthermore, page 5 of the Office Action states that "[t]he specification does not indicate that an angle even slightly greater than 80 has any critical importance." However, case law and the MPEP clearly do not require that the specification specifically state that dimensional limitations are critical (see MPEP §716.02(f)). Thus, it is irrelevant whether the specification does or does not discuss the criticality of the dimensions.

Therefore, Hoshina, as indicated above, only teaches an acute angle in the range of 40-80 degrees, otherwise, an angle greater than 80 degrees will result in adhesion which causes cracks or breakage when taking out the wafer 3 from the pocket. Thus, Applicant traverses the assertion that Hoshina teaches Applicants' invention.

For at least the reasons outlined above, Applicant respectfully submits that neither Honma nor Hoshina, alone or in combination, disclose, teach or suggest, including the projections have a beveled edge, such that an acute angle greater than 80 degrees occurs between the lower surface and the beveled edge as recited in independent claim 1, and similarly independent claims 7 and 15, of Applicants' invention.

For the reasons stated above, the claimed invention, and the invention as cited in independent claims 1, 7 and 15, and related dependent claims 2-6, 9-14 and 17-18, is fully patentable over the cited references.

B. The Rejection Based on Zhao in View of Hoshina

Regarding independent claims 1, 7, and 15, and related dependent claims 2-6, 9-14 and 17-19, first, the references, separately, or in combination, fail to disclose, teach or suggest a reason or motivation for being combined.

Second, even assuming that the references would have been combined, Zhao does not teach or suggest the features of independent claim 1, and similarly independent claims 7 and 15, including the projections have a beveled edge, such that an acute angle greater than 80 degrees occurs between the lower surface and the beveled edge. (See above).

Indeed, the Office Action admits that Zhao "do[es] not disclose [a] plurality of beveled edge projections extending radially inward from the inner edge," let alone, the above indicated feature. Accordingly, Zhao is deficient in not disclosing Applicants' claimed invention. (See Office Action, Page 3, Section 5).

Hoshina is also deficient for the reasons indicated above.

Therefore, Hoshina, as indicated above, only teaches an acute angle in the range of 40-80 degrees, otherwise, an angle greater than 80 degrees will result in adhesion which causes cracks or breakage when taking out the wafer 3 from the pocket. Thus, Applicant traverses the assertion that Hoshina teaches Applicants' invention.

For at least the reasons outlined above, Applicant respectfully submits that neither Zhao nor Hoshina, alone or in combination, disclose, teach or suggest, including the projections have a beveled edge, such that an acute angle greater than 80 degrees occurs between the lower surface and the beveled edge as recited in independent claim 1, and similarly independent claims 7 and 15, of Applicants' invention.

For the reasons stated above, the claimed invention, and the invention as cited in independent claims 1, 7 and 15, and related dependent claims 2-6, 9-14 and 17-18, is fully patentable over the cited references.

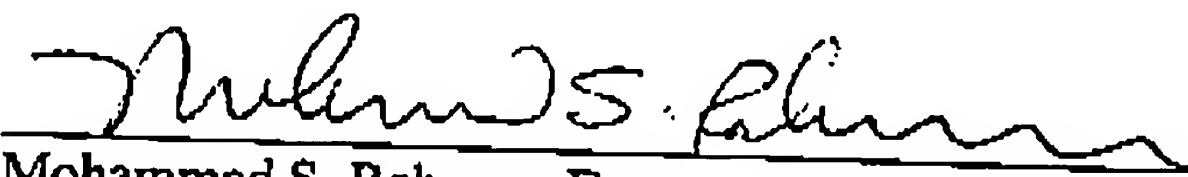
II. Formal Matters and Conclusion

In view of the foregoing, Applicants submit that claims 1-7, 9-15 and 17-18, all the claims presently pending in the application, are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary. Please charge any deficiencies and credit any overpayments to Attorney's Deposit Account Number 09-0456.

Respectfully submitted,

Dated: January 31, 2005


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